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THE
ASSURANCE MAGAZINE,
AND
JOURNAL
OF THE
INSTITUTE OF ACTUARIES.

Plan for Simplifying and Improving the Measures, Weights, and Money of this Country, without materially altering the present Standards. By LIEUT.-GENERAL SIR C. W. PASLEY, K.C.B., R.E., F.R.S., &c. &c.

[Read before Section F—Economic Science and Statistics—of the British Association for the Advancement of Science, at Cheltenham, on Tuesday, the 12th of August, 1856.]

PRELIMINARY OBSERVATIONS.

THE Duke of Wellington, as Master-General of the Ordnance, having given orders in 1825 that practical architecture should form part of the course of instruction of the junior officers attending the Royal Engineer Establishment at Chatham, under my direction, which had hitherto been confined to their duties in the field, and a Professor in every respect competent having been selected for that duty, I was induced to enter into the details of measuring and estimating buildings and other works myself—which I had never done before, because, like other officers of my corps, who studied the other branches of practical architecture and engineering with pleasure, I had, when employed in garrison duties, left those details to the clerks of works, and to the overseers and foremen of the department.

In this inquiry, being entirely new to the subject, I soon found that the rules for measuring and estimating every description of artificers' and labourers' work were embarrassed by unnecessary

and even absurd difficulties, arising partly from the complexity of our national measures and weights, and partly from the nature of our coinage, in both of which decimal are intermixed with duodecimal and binary subdivisions of the discordant units assumed for measuring and pricing workmanship and materials. These gratuitous and perplexing difficulties, which escape the observation of young men educated at preparatory schools for those professions, and articulated at the age of eighteen or nineteen to civil engineers, architects, and surveyors, as well as of the operative mechanics employed under their direction, who are apprenticed to their respective trades at a much earlier age, struck me so very forcibly that I saw the necessity of getting rid of them; and in the hope of effecting that object, after having paid the greatest attention to the subject for at least five years beforehand, I published a small volume in the year 1834, entitled *Observations on the Expediency and Practicability of Simplifying and Improving the Measures, Weights, and Money used in this Country, without materially altering the present Standards*: in which I proposed an entire revision and reform of the whole of these standards without exception, such as, to the best of my knowledge, had never been suggested before.

In 1847, I presented a paper containing an abstract of my plan of improvement to the British Association at Oxford, which was published in the *Transactions* of the Sections of that year, page 43; and last year a similar paper, with improvements, was drawn up by me, and the substance of it read and discussed at the meeting of the Association at Glasgow, but was not published, because I was requested to take it home and shorten it, which I had not time to do before the other *Transactions* of the Association were printed. I now beg leave to submit it to the Association, as the final result of my researches and reflections on this important subject, in which I have taken the greatest interest for a quarter of a century.

I.—GENERAL TABLE OF NEW LINEAL MEASURES PROPOSED.

10 tenth parts	.	.	.	.	1 imperial inch.
10 imperial inches or 100 parts	.	.	.	.	1 foot.
3 feet	.	.	.	.	1 yard.
6 feet	.	.	.	.	1 fathom.
1,000 fathoms	.	.	.	.	1 mile.
60 miles	.	.	.	.	1 degree of the terrestrial meridian.

For Architectural and Mechanical purposes.

10 tenth parts	.	.	.	.	1 imperial inch.
10 imperial inches or 100 parts	.	.	.	.	1 foot.

For Cloth Measure.

2 half tenths	.	.	.	.	1 tenth of a yard.
$2\frac{1}{2}$ tenths	.	.	.	.	1 quarter.
5 tenths	.	.	.	.	1 half.
$7\frac{1}{2}$ tenths	.	.	.	.	3 quarters.
10 tenths	.	.	.	.	1 yard.

For Itinerary Measure.

10 links	.	.	.	.	1 fathom.
100 links	.	.	.	.	1 chain of 10 fathoms.
100 chains or 1,000 fathoms	.	.	.	.	1 mile.

Measures of Temperature and Air.

The centigrade thermometer, generally used in France and other countries, having its zero at the freezing point—the only invariable point of temperature in nature—and its one hundredth degree determined by the temperature of boiling water, when the barometer stands at $24\frac{1}{2}$ inches of the new lineal measure proposed to be adopted in preference to Fahrenheit's scale. The barometer to be marked in inches and tenths of the new measure.

The new standard of lineal measure to be the fathom of 6 feet, marked on a rod of brass or other metal, and made equal to 6 feet 0·91548 inch of our present measure, at the temperature of 62·6 degrees of Fahrenheit or 17 degrees of the centigrade thermometer. This proportion will make the proposed mile equal to 1012·715 fathoms of our present measure, being the mean length of the minute of a degree of a terrestrial meridian, according to Mr. Airy's treatise on the figure of the earth in the *Encyclopædia Metropolitana*. Should more extensive surveys of meridional arcs, since made or in progress, lead to a more accurate value of the said minute, it is proposed that the necessary correction shall be effected, not by changing the standard rod, but by altering the legal temperature to a higher or lower point than 62·6 degrees of Fahrenheit.

For measuring works of architecture and engineering, the foot and its decimal subdivisions will be the unit, without reference to the fathom; and all workmanship measured by lineal measure must be priced by the foot, the 10 feet, or the 100 feet, not by the yard or rod.

For itinerary measure or land surveying the fathom will be the unit, without reference to the foot. The mile will be the nautical or geographical mile, the only universal measure recognized by all civilized nations. The proposed new fathom and foot will differ so little from our present standards—only by one eightieth part of

the latter in excess—that, supposing the two fathoms to be set up at some little distance apart, no person standing between them, and who consequently could not see both at the same time, would be able, after having looked at both, to say which of the two was the shortest.

II. NEW SQUARE OR SUPERFICIAL MEASURE PROPOSED.

For Architectural and Mechanical purposes.

All work now measured by the superficial foot to be priced in future by the square foot, by the 10 square feet, or by the 100 square feet, and not by the square yard or rod.

For Cloth Measure.

Cloth to be priced by the new or imperial yard, in the same manner as is now done by the present standard yard.

For Land Measure.

100 square links	.	.	.	1 square fathom.
1,000 square fathoms	.	.	.	1 imperial acre.
1,000 imperial acres	.	.	.	1 square mile.

III. NEW MEASURES OF SOLIDITY AND CAPACITY PROPOSED.

Of Solidity for Architectural or Mechanical purposes.

1,000 cubic inches	.	.	.	1 cubic foot.
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For Wholesale Dealings.

100 cubic inches	.	.	.	1 can.
10 cans or 1,000 cubic inches	.	.	.	1 cubic foot.
10 cubic feet	.	.	.	1 quarter of can.

For Retail Dealings exclusively.

2 gills or 10 cubic inches	.	.	1 half pint or chopin.
2 chopins	.	.	1 pint.
2 pints	.	.	1 quart.
2½ quarts or 5 pints	.	.	1 can.

Thus the cubic foot will be divided into 10 cans, 25 quarts, 50 pints, 100 chopins, and 200 gills. The new names *can* and *chopin* are recommended to designate the tenth and the hundredth parts of the cubic foot respectively, being its most important subdivisions. The latter is a Scotch word.

In measuring corn for wholesale dealings, as well as sand, lime, &c., I propose to use measures of 1 cubic foot and of 5 cubic feet, open at the top and bottom, to be laid upon a level floor. Two of the latter to be put together and form a 10-cubic-feet measure.

Beer, wine, and other liquors, to be priced and gauged, and the

duties collected, by the cubic foot. In retail dealings they should be sold by the ten bottles instead of the dozen, and each bottle should contain a quart or pint.

New Apothecaries' Liquid Measure proposed.

50 minims . . .	1 tenth of an imperial cubic inch.
500 minims or 10 tenths . . .	1 cubic inch.
10 cubic inches . . .	1 half pint or chopin.

This will differ so very little from the present apothecary's liquid measure, that no medical practitioner can hesitate in adopting it.

IV. NEW MEASURES OF WEIGHT PROPOSED.

10 tenth parts . . .	1 imperial ounce.
10 ounces . . .	1 imperial pound.
100 pounds . . .	1 hundredweight.
1,000 pounds . . .	1 thousandweight.
2,000 pounds . . .	1 imperial ton.

For Retail Dealings exclusively.

2½ tenths . . .	1 quarter	} of an imperial ounce.
5 tenths . . .	1 half	
7½ tenths . . .	3 quarters	

For Coins, Bullion, &c., and for Apothecaries' Weight.

10 hundredth parts of a grain . . .	1 tenth part.
10 tenth parts . . .	1 grain.
1,000 grains . . .	1 imperial ounce.

The standard one-pound weight to be exactly one sixtieth part of the weight of the new cubic foot for distilled water, as ascertained by brass weights, at the temperature of 17 degrees of the centesimal thermometer, or 62·6 degrees of Fahrenheit, with the barometer standing at 24½ inches of the new lineal measure. By this arrangement 100 lbs. of the new will be equal to about 108 lbs. of the present avoirdupois weight.

All goods now sold by avoirdupois weight to be priced in future by the imperial pound, and its decimal multiples the 10 lbs., the 100 lbs., and the 1,000 lbs., to the exclusion of stones, quarters, hundredweights and tons of our present avoirdupois weight. For retail purposes the new ounce and its tenth parts to be used. The grain, being subdivided into tenths and hundredths for very delicate purposes, and its decimal multiples the 10 grains, the 100 grains, and the 1,000 grains or imperial ounce, will be used exclusively for weighing and pricing all valuable articles to which troy weight is now applied, and to the entire exclusion also of pearl weight, diamond weight, and all the carat weights. For apothecaries'

caries' weight, to which it is also applied in preparing medical prescriptions, and which requires the use of the grain as well as of the ounce, the difference between the present and the proposed new grain and imperial ounce are not worth noticing.

Barrels and casks of various denominations, as well as sieves, baskets, sacks, boxes and other packages, now designating special quantities or weights of beer, wine, fruit, corn, and other goods, together with the various customary loads, lasts and weys, all differing from each other, not to be used as measures or weights without specifying the contents or the amounts of each in cubic feet or pounds weight, as may be.

If the foregoing suggestions, or any system on the same principle, for simplifying the national measures and weights, should be adopted, the fine idea generally supposed to have been intended in Magna Charta, and most clearly and unequivocally expressed in one of our ancient laws of a subsequent date, but which has never yet been realized in this country, will be literally accomplished, namely, that **THERE SHALL BE ONLY ONE MEASURE AND ONE WEIGHT THROUGHOUT ALL THE LAND.**

V. NEW MONETARY SYSTEM PROPOSED.

10 farthings	1 cent.
10 cents or 100 farthings	1 florin.
10 florins, 100 cents, or 1,000 farthings	1 pound sterling.

Setting aside all the new coins proposed by me in my first publication of 1834, except the tenth of the pound (since called the florin) and the silver cent—and setting aside also my attempt to simplify the monetary system therein proposed, in the paper read to the British Association at Oxford in 1847, which I admit was by no means an improvement—I now think that the only new coin that ought to be issued is the silver cent, and that no silver coin greater than the florin should be coined in future, gradually withdrawing all the crowns and halfcrowns still in circulation as soon as florins to an equal amount can be issued from the Mint to replace them.

When any sum of money of the new coinage is written in sterling money, the last figure or unit of the pound should always terminate in a point, after which the next three figures will designate florins, cents, and farthings, whether having these denominations marked over them or not; but more than three such figures must never be used.

I am also of the opinion, now adopted by the Council of the Decimal Association, of which I am a member, that instead of

coining new copper mills, or tithings as I called them at first, it will be much better to declare by royal proclamation that the farthing shall be the tenth part of the cent and the thousandth part of the pound, or to make it so by Act of Parliament; but it does not appear to me to be necessary to withdraw any of the smaller silver coins, such as the threepenny and fourpenny silver pieces, which, though not known when I first published, have been a very great convenience to the public, and which none of the working classes ever mistake for one another, even in the dark, nor will they confound any of them with the new silver cent proposed.

DIFFICULTIES URGED AS OBJECTIONS TO THE DECIMAL COINAGE
PROPOSED: THEIR GROUNDLESSNESS.

1st. The great length of time necessary for carrying it into effect.

This difficulty has only arisen from the supposed necessity of “substituting a purely decimal money for that already in circulation, in which each silver and copper piece shall carry marked on it its decimal value, the pound being unity.” But when we consider that after the first sovereigns were coined there were no less than five gold coins in circulation—the guinea, the halfguinea, the third of a guinea, or seven-shilling piece, the sovereign, and the halfsovereign; and that at the same time there were four silver coins—the crown, the halfcrown, the shilling, and the half-shilling; and three copper coins—the penny piece, the halfpenny piece, and the farthing, none of which were stamped either with their name or value, and yet every person knew the names and value of the whole of them, the above tedious and expensive process, calculated as the work of twenty years, must be allowed to be perfectly useless.

2nd. The supposed injury that will be done to the working classes by depreciating the value of the copper coinage.

The worst-paid agricultural labourers in this country are always paid their week’s wages in silver; and, even by the day, silver must form a part of their payment, the copper merely being the change. Hence, instead of losing, the poor man will gain; because with every shilling he will be able to buy twelvecpence halfpenny, and with every halfshilling or silver sixpenny piece he will be able to buy sixpence farthing. So much for the POOR MAN’S PENNY.

3rd. The question of penny tolls.

The difficulty attending this question may be got rid of by the following very simple arrangement:—

Supposing that a toll of one penny is due for passing a certain gate all the year round, Sundays included, and that a farmer or other person is obliged by his business to pass through it every day in the year, the charge for one year will be thirty shillings and five pence of our present currency.

After the value of the present copper coinage shall be depreciated, let the turnpikeman charge one penny for every day in the year excepting on the 5th, 10th, 15th, 20th and 25th days of every month, on which he is to be allowed to charge one penny farthing.

Hence there will be 305 days in the year charged at 4 farthings,	
amounting to	1,220 farthings,
and 60 days in the year charged at 5 farthings,	
amounting to	300 „
Total	1,520 farthings.

Since the farthing will now have become the one thousandth part of the pound sterling, 1,500 farthings will be equal to 30 shillings, with 20 farthings or 5 pence over, and thus the amount he receives from the passengers will be the same as before.

Advantages of the new System of Measures, Weights, and Money proposed.

In the first place, the mile proposed, being the nautical or geographical mile, used exclusively for the purposes of navigation by all the maritime nations of the world, not excepting the French, and inserted in the scales not only of charts, but also of the maps of all countries, in addition to scales of the customary leagues, miles or other itinerary measures of those countries, is already a universal measure, and the only one now recognized in every part of the globe. Hence, if the governments of all civilized nations should hereafter appoint competent commissioners to assemble and report upon the best universal standards of measure and of weight, to be adopted by common consent of all—the fathom or toise, and the foot derived from the proposed mile, might justly claim the preference, because the latter differs so little from the former foot of France, and from the present foot of all other countries, that it would not cause any embarrassment to practical men, nor any more confusion than the substitution of the imperial gallon for the former ale and beer gallon has done in this country: that is, little or none. The same remark applies to the standard pound weight, derived from the proposed cubic foot, which in like manner differs so little from the former French pound weight, and from the present pound

weights of other countries, that no embarrassment or confusion could be created by adopting it.

By the new system proposed, a simplicity and precision will be given to measures of distance and of area on the surface of the globe, of which our present standards afford no criterion. For example: nobody knows or can even guess how many rods or yards there are in a given number of statute miles, nor how many acres or square rods there are in a given number of square miles of our present measure, which can only be ascertained by very troublesome calculations; but 173 miles of the new measure would be known at once to be 173,000 fathoms, and 248 square miles to be equal to 248,000 imperial acres, or to 248 million square miles.

In like manner, though no one can even guess how many cubic feet a given number of gallons of our present standard measure of capacity are equal to, or *vice versâ*, this embarrassing uncertainty, and the necessity of very troublesome calculations in order to compare those two denominations together, will be avoided by establishing the cubic foot as the only standard both of solidity and capacity.

In buildings and other works of architecture, engineering, &c., which are always measured by the foot, the necessity of computing artificers' and labourers' work, as well as materials, duodecimally—and, in goods sold by weight, the troublesome reduction of tons into cwts., quarters, and pounds, and *vice versâ*—and in all accounts the reduction of pounds sterling into shillings, pence and farthings, and *vice versâ*—will also be avoided, which will be an immense saving of time, trouble, and risk of error.

After a very careful investigation of the history of our national weights and measures, from the time of Alfred to the present day, I have ascertained that, with the exception of our lineal measure, none of our present standards are venerable from their antiquity, as might naturally be supposed by those who have not had the means of such investigation; they having, on the contrary, been subject to much greater changes than any which I now propose, and all those changes having originated from accident, error, bad workmanship, or neglect (with the exception of the establishment of the imperial gallon in 1824), which, strange to say, but no less true, was the first and only modification of our existing standards, adopted systematically, as an improvement and with a view to the public benefit, in the course of 800 years. Such as they were, however, even the legal standards were disregarded in every part of the kingdom, where such an immense number of incongruous

and discordant local measures and weights prevailed, differing in such an extraordinary manner from those standards and from each other, not only in every county, but in every market, as rendered them a perfect chaos, and quite as unintelligible to the public generally as those of the ancient Egyptians or Babylonians would be.

Objections to the French Metrical System: that it has proved an entire failure as regards astronomy and navigation, and that, instead of producing uniformity, it has caused greater confusion in the weights and measures of France than ever prevailed before.

Let it be understood that I never wrote on any subject, literary or scientific, unless it had a practical bearing on the safety of the nation in time of war, or on the duties of engineer officers. It was only my analysis of the customary system of measuring and estimating buildings and works, adopted by the architects and engineers of this country, that induced me to enter into the study of measures and weights at all; and, as a necessary consequence, to compare our own standards with the decimal metrical system adopted in 1793 by the republican government of France, on the recommendation of the *Academy of Sciences and Arts of Paris*, to whom the question of uniformity of weights and measures had previously been referred in 1789, the standards of which were afterwards determined in reference to the length of the seconds pendulum, and to the mean length of the terrestrial meridian, by select members of the same learned society. After practically investigating the subject of weights and measures in all its bearings, as applied to navigation, architecture, and the mechanical arts, to commercial transactions, and to the daily business of life, I came to the conclusion that the purely decimal system of those celebrated French philosophers was one of the most injudicious that could have been adopted.

Admitting the talents and science of the members of that Academy, which afterwards became the National Institute of France, I believe that no plan of a public measure of any importance was ever worse concocted or more injudicious, or has been subject to more capricious changes, than what was originally called the republican system of weights and measures; upon which far more legislation has been expended, from 1789 to the present day, than can be found in all the English statutes on the same subject since the Norman Conquest. In short, the much-vaunted decimal metrical system of the French Republic may justly be considered the *bathos* of legislation, for it was a vain attempt to annihilate all men's

former notions of time and space; and, though planned by some of the most eminent astronomers of France, the master mariners as well as the seamen of that country rejected from the first the decimal divisions of time and of the circle, of which they soon found out the absurdity even as applied to the theory of astronomy. And they no less peremptorily rejected the decimal degrees of the terrestrial meridian of 100,000 metres or 100 myriametres each, and the decimal minutes of the meridian of 10,000 metres or 10 kilometres each; and the French pilots rejected with disdain the smaller decimal parts of the same newfangled measures for the length of their log lines, as well as the decimal division of the horizon into 40 rhumbs instead of the 32 points of the compass; and it is only within the last few years that the French may have taken their soundings by metres.

It is strange that it never occurred to the celebrated astronomers who decided upon the decimal divisions of time, and of the circle, and of the terrestrial meridian, that it was an absolute impossibility to introduce the first until all the watches and clocks of France were replaced by time-pieces according to the new system; or the latter, until all the naval charts and maps in possession of the mariners and geographers of France were replaced by new ones, graduated according to the decimal system; and, what is more, until all other nations adopted the same decimal metrical system that they proposed, and also took the steps absolutely necessary for carrying these sweeping changes into effect, by condemning all their old time-pieces, charts, and maps, and having new ones made. For astronomical tables nothing could be more injudicious than the much-lauded decimal metrical system of these philosophers, because the diurnal rotation of the earth on its axis, and its annual revolution round the sun, as well as the motions of the moon, its satellite, and those of the other planets and their satellites, composing the solar system, when compared together in their respective orbits, the lesser to the greater, as aliquot parts or multiples of one another, in any possible order of combination, involve the most complex fractions or mixed numbers, of which the fractional parts, when expressed decimally, run on *ad infinitum*; whereas the ordinary divisions of time and the sexagesimal divisions of the circle and of the terrestrial meridian approximate much more nearly to the motions of the heavenly bodies, and are, therefore, far better adapted for astronomical calculations.

The new decimal metrical system, as applied to weights and

measures, was almost equally inoperative, for, excepting in the collection of duties or other transactions to which the Government was a party, and in all written agreements relating to wholesale commercial transactions, in which it was rendered imperative by law, the *metres, ares, litres, steres* and *grammes*, which are the units of that system, with their pedantic Latin and Greek prefixes, occasioned so much confusion, that they were never used at all during the Republic, the Consulate, and the first years of the Empire, being perfectly unintelligible to the people of France, so that at last the Imperial Government was compelled to yield to popular resistance; and, with the aforesaid exception, the decimal system was virtually abolished by a decree of the 12th of February, 1812, establishing what was called the *usual or customary system* of weights and measures, of which a new *toise* or fathom of 6 feet, for the use of engineers, architects, and mechanics, exactly equal to 2 metres; a new *aune* or ell for cloth measure, equal to 12 decimetres; a new *boisseau* or bushel for dry goods, equal to one eighth of a hectolitre; and a new *livre* or pound weight, equal to one half kilogramme—that is, to 5 hectogrammes, 50 decagrammes, or 500 grammes—were the standards, which were all subdivided, the usual foot duodecimally, the usual ell by binary division, and the usual bushel and usual pound weight by a mixture of binary and duodecimal division, into the same number of aliquot parts bearing the same denominations as the ancient standards of France during the Monarchy, from which they all differed more or less considerably. The old standards were however abolished under severe penalties; but the standards of the “usual” were rendered equally legal with those of the decimal system, and all persons who sold goods by retail were obliged to provide themselves with both. The standards of the usual weights and measures had their value according to the decimal system also marked on each, and it was left optional for retail dealers to sell by either: which led to so much imposition that it was found necessary in 1816 to issue a royal decree of Louis XVIII., absolutely forbidding the use of decimals in shops, markets, or any other inferior departments of trade or retail business. Thus the people of France were obliged to make themselves masters of three different and incongruous systems of weights and measures—those of the Monarchy, those of the Republic, and those of the Empire; and it was not till the year 1837 that a law was enacted under King Louis Philippe to abolish the usual and inflexibly enforce the decimal metrical standards after the 1st of January, 1840—it being hoped, by

the promoters of this law (of whom the celebrated Marquis de la Place, in the Chamber of Peers, was the most strenuous), that the rising generation of France had by this time become so generally instructed in decimal arithmetic, that they would be able to understand and appreciate the latter. Should this have proved more successful than the former attempts to accomplish the same object, all I can say is, that the French nation has been a long time in learning decimals; and meanwhile the confusion, or rather confusion worse confounded, of these changes, offers a warning to other nations of what ought to be avoided.

In the year 1799 a work entitled *Manuel, Pratique et Élémentaire, des Poids et des Mesures, des Monnaies et du Calcul Décimal*, was published by S. A. Tarbé, containing tables of comparison of the former legal standards of France during the Monarchy, and those of the new decimal metrical system, with explanations and instructions for using them: to which, in a tenth edition of 1813, he added tables of the usual system also, in which he reprobated the adoption of the decimal system for the purposes of navigation and astronomy, in very strong language; and after giving an example of the confusion that would be caused thereby, he emphatically remarks that “in the ordinary transactions of life, errors in calculation cost money—in navigation, they cost men;” and in his article on the mariner’s compass he is equally strenuous in opposing the decimal divisions of the circle as applied to that instrument. But whilst so strongly reprobating the decimal metrical system of the Republic, M. Tarbé took great care not to depreciate its application to the weights and measures of commerce: which has rendered his complex and voluminous tables, carried down to the present day by successive new editions, since published by his family, not only useful, as he modestly expresses it, but absolutely necessary to all bankers, merchants, contractors, land surveyors, notaries, proprietors, employés of the administrations, instructors and pupils of the schools of France, and to foreigners.

By personal observation and inquiry in the shops and markets of France in the summer of 1854, I know that the same confusion still prevails, and that one may buy goods either by the decimal or by the usual weights and measures; and I know of no case in which the metre has entirely supplanted the old measures, except for soundings as before mentioned, and for cloth measure, because it is a more convenient measure for cloth than the old French *aune*, which was rather too long for that purpose. Under such considerations it will not be wondered at that I most strenuously op-

posed Mr. James Yates, M.A., F.R.S., and other advocates of that system, when they publicly recommended at the Society of Arts and at the Institution of Civil Engineers that we should abandon our own time-honoured system of measures, weights, and money, and adopt the revolutionary system of the French Republic, which, as I said before, I have always reprobated, having become convinced that the decimal metrical system of the French, which was professedly intended for the imitation of all mankind, was as great a failure in science as their other theories of liberty, equality, and the rights of man have been in legislation.

The new silver cent pieces proposed should be stamped with the words ONE CENT OR 10 FARTHING. The present sixpenny pieces need not be called in; but when more are required, let them be stamped with the words, ONE HALFSHILLING. In like manner, when more of the present fourpenny pieces are required, let them be stamped ONE THIRD OF A SHILLING; and when more of the present threepenny pieces are required, let them be stamped ONE FOURTH OF A SHILLING. To add anything more would be superfluous.

On the Mortality arising from Naval Operations. By WILLIAM BARWICK HODGE, Esq., Fellow of the Statistical Society and of the Institute of Actuaries.*

[Extracted from the *Journal of the Statistical Society.*]

TO ascertain with precision the loss of life occasioned by war is an object of so much importance in every point of view, whether national or social, that whatever apology may be required for the manner in which the present subject is treated, none can be necessary for bringing it forward.

That so little should have been done towards the elucidation of the question, is no doubt partly attributable to the difficulty of obtaining accurate information with respect to it, but in a greater degree, perhaps, to the reluctance to dwell upon it felt by the public.

It certainly is a painful task to endeavour, in the words of a celebrated military writer, "to sound the stream of blood in all its horrid depths"; but in this country, where every citizen may be

* The publication in which this paper first appeared is probably in the hands of some of our readers and is accessible to most others; as it was always intended, however, that this *Journal* should contain, for the most part, whatever bears upon the subject to which it is devoted, and as the paper itself is an important one, we have not hesitated to give it insertion.—ED. *A. M.*